# VITALSIGNS

Reports on the condition of STEM learning in the U.S.



### LOST OPPORTUNITY

Few U.S. Students Participate in STEM Out-of-School Programs

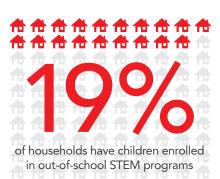
Out-of-school programs in science, technology, engineering and mathematics (STEM) can strengthen young people's grasp of and enthusiasm for those critical fields. It's troubling that children in four out of five households do not (or cannot) take part in them.

Change the Equation (CTEq) has, for the first time, examined how many children and teens in the United States participate in STEM programs outside of the school day. Our survey of more than 17,000 U.S. households with children in K-12 was conducted with the pro bono support of Nielsen, an information and measurement company. The survey finds that only 19 percent of those households have any children enrolled in out-of-school STEM programs. (For an overview of the survey questions and methodology, please see www.changetheequation.org/STEMoutofschool.) This represents a lost opportunity for American children and youth, who sorely need all the exposure to the STEM fields they can get.

U.S. students' middling to mediocre performance in STEM subjects has been well documented. These shortcomings conspire with weak interest in STEM subjects to narrow the pipeline of STEM talent at a time when employers are hard pressed to meet the growing demand for STEM knowledge and skills.¹ Well over half of high school seniors, including many who are proficient in math, are not interested in pursuing STEM fields.² It should therefore come as little surprise that the United States ranks behind 26 other developed countries in the share of college students who earn undergraduate degrees in science and engineering.³

Out-of-school programs in STEM can help turn the tide. Research suggests that they can boost young people's grasp of and interest in STEM by offering hands-on experience and connections to real-world problems.<sup>4</sup> In the process, they can increase graduation rates and inspire more students to pursue STEM majors in college.<sup>5</sup> Out-of-school programs are also more likely than schools to expose students to engineering and technology.<sup>6</sup>

The results of our survey suggest that out-of-school programs in STEM are a largely untapped resource in our efforts to broaden the pipeline of STEM knowledge and skills.



#### What We Still Need to Know

CTEq's and Nielsen's new findings have revealed the magnitude of our challenge, but we need better information on the causes of low participation, the geographic spread of programs and the quality of current out-of-school options. Such information can help us better understand our challenges and design specific strategies to address them.

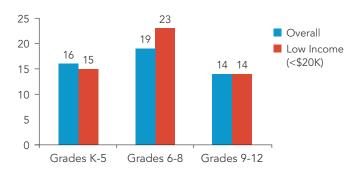
Why is participation low? Are there too few programs to meet demand? Are parents and their children not taking advantage of existing programs? Are programs too expensive? There is scant research to help us answer these questions about STEM programs.

How good are existing programs? Though we know that out-of-school programs in STEM *can* boost student interest in and grasp of STEM fields, we lack information on the overall quality and impact of programs currently available to American children and teens.



nielsen

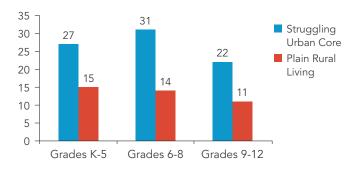
### Participation is especially low among elementary and high school students



Source: Nielsen Custom Survey, Homescan Panel, September/October 2011.

This finding should trouble us. Early exposure to STEM is critically important, especially given the dwindling time elementary schools have been devoting to science over the past two decades.<sup>7</sup> Participation in high school is no less important in light of the evidence that out-of-school programs can combat the widespread disengagement from school that fuels high dropout rates.<sup>8</sup>

## Students in struggling urban cores participate at higher rates, but those in rural households get the short end of the stick



Source: Nielsen, 2011.

The response from households in "struggling urban cores" represents a brighter spot in our survey results. Though the intense need for such programs in urban areas may certainly still outstrip supply, our results suggest that federally- and privately-funded efforts to give low-income urban children out-of-school learning opportunities are having an impact. Ochange is possible.

Yet the picture is far less rosy for another group in real need of out-of-school STEM opportunities: children and teens who live in what Nielsen calls "plain rural living" areas. Rural students in this category already have several strikes against them. They are less likely than American students as a whole to have access to challenging math and science classes, qualified math and science teachers, STEM learning resources, role models in STEM fields, and community resources such as science museums. 11 At a time when we should be leveling the playing field for rural children, low participation in out-of-school STEM programs is actually exacerbating the disparities.

### Nielsen's Geographic Categories

**Struggling Urban Cores:** Low-income urban neighborhoods with large Black and Hispanic populations.

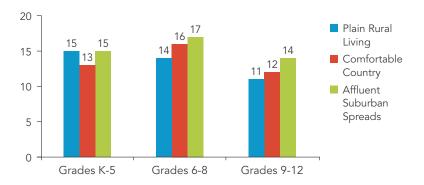
**Affluent Suburban Spreads:** High-income, largely white areas in the suburban ring of metropolitan areas.

**Comfortable Country:** Middle class areas in metropolitan fringes or secondary cities.

Plain Rural Living: Small towns and rural areas with low population density and second lowest income behind struggling urban cores.

Research suggests that out-of-school programs can boost young people's grasp of and interest in STEM by offering hands-on experience and connections to real-world problems.

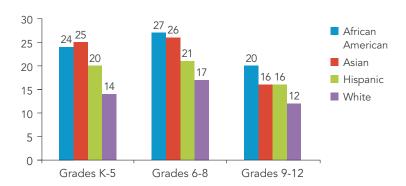
## Affluent and middle class suburban students participate at low rates



Source: Nielsen, 2011.

Students from affluent suburban and middle class suburban fringe households are only slightly more likely than students in plain rural living households to take part in STEM out-of-school programs.

## African American and Asian households are most likely to participate in out-of-school STEM programs. White households are least likely to do so.



Source: Nielsen, 2011.

Students from households of different races and ethnicities are participating in STEM out-of-school programs at remarkably different rates. There are surely geographical, economic and cultural reasons for these disparities, which further research could lay bare. Yet it is safe to say that no racial or ethnic group is feeling the full benefit of such programs.

#### What should we do?

Big differences in participation by race, ethnicity, geography, income level and grade level confirm that no single strategy can address the diverse but pressing need for more and better out-of-school STEM opportunities. Rural areas, which face unique challenges such as limited community resources and transportation options, may for example have to forge stronger connections between out-of-school STEM programs and existing institutions, such as schools or family service organizations. 12 Existing K-5 programs might have to incorporate more excellent STEM content. Programs for high school students, which compete with afterschool athletics, jobs and even childcare responsibilities, should feature career and college preparation, offer flexible schedules and allow youth some control of their own activities. 13

Yet there are broad strategies for extending the reach and impact of STEM out of school:

- Continue expanding access for children and youth, regardless of their age, their background, or where they live. A survey by the Afterschool Alliance found that large percentages of parents with children across grade levels, demographic groups and geographies would enroll their students in out-of-school programs if they knew such programs were available to them. 14 Corporate and private funders can help expand access by supporting proven or promising programs.
- Better promote the programs that already exist. For example, Time Warner Cable's philanthropic initiative, Connect a Million Minds, offers a "Connectory" that allows students and parents to search for STEM opportunities in their communities. (See www.connectamillionminds.org).<sup>15</sup>
- Beat the drum for better information about program quality. We need to learn much more about the quality of out-of-school STEM programs in the marketplace before we can truly know we're giving students the opportunities they need. Measures of quality might include academic measures, such as test scores, and non-academic measures, such as evidence of engagement.

Young people spend most of their waking hours out of school. That's an enormous resource to leave untapped.

- <sup>1</sup> Change the Equation, STEM Help Wanted, Vital Signs Brief. Washington, DC, 2012
- <sup>2</sup> Business Higher Education Forum, Meeting the STEM Workforce Demand: Accelerating Math Learning Among Students Interested in STEM, Research Brief, October 2011.
- <sup>3</sup> Organisation for Economic Cooperation and Development. *Education at a Glance, 2009: OECD Indicators*; Table A-3.5.
- <sup>4</sup> B. Bevan, V. Michalchik, R, Bhanot, N. Rauch, J. Remold, R. Semper, and P Shields, Out-of-School Time STEM: Building Experience, Building Bridges, San Francisco: Exploratorium, 2010.
- <sup>5</sup> Afterschool Alliance, STEM Learning in Afterschool: An Analysis of Impact and Outcomes, Washington, DC, September 2011.
- <sup>6</sup> S.E.O Schwartz and G.G. Noam, Informal science learning in afterschool settings: A natural fit? (Commissioned Paper), Washington, DC: National Research Council, 2007.
- <sup>7</sup> In the 2007-08 school year, the average elementary class and teacher responsible for teaching all core subjects spent 2.3 hours per week on science education. By comparison, in the 1993-94 the average elementary class spent 3.0 hours per week on science education. U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public Teacher Data File," 1987-88, 1990-91, 1993-94, 1999-2000, 2003-04, and 2007-08; "Public School Data File," 1987-88, 1990-91, 1993-94, 1999-2000, 2003-04, and 2007-08; "Charter Teacher Data File," 1999-2000; and "Charter School Data File," 1999-2000.

- <sup>8</sup> S.N. Deschenes, A. Arbreton, P.M. Little, C. Herrera, J.B. Grossman, H.B. Weiss, Engaging Older Youth: Program and City-Level Strategies to Support Sustained Participation in Out-of-School Time, Cambridge, MA: Harvard Family Research Project, 2010.
- <sup>9</sup> A 2010 survey by the Afterschool Alliance found that parents of six million urban children who are not taking part in afterschool programs "say they would enroll their children if a program were available to them." Afterschool Alliance, America After 3pm: From Big Cities to Small Towns, Washington, DC, 2010.
- <sup>10</sup> The federally-funded 21st Century Community Learning Centers, for example, include a strong focus on out-of-school programs for urban youth.
- <sup>11</sup> S.E. Graham, Students in Rural Schools Have Limited Access to Mathematics Courses, Durham, NH: The Carsey Institute of the University of New Hampshire, fall 2009. Z.A. Barley and N. Brigham, Preparing teachers to teach in rural schools (Issues & Answers Report, REL 2008–No. 045), Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central, 2008.
- <sup>12</sup> E. Wright, Finding Resources to Support Rural Out-of-School Time Initiatives, Washington, DC: The Finance Project, 2003.
- <sup>13</sup> L. Friedman and M. Bleiberg, Meeting the High School Challenge: Making After-School Work for Older Students, New York: The After-School Corporation, 2007.
- $^{\rm 14}$  Afterschool Alliance, America After 3pm, 2010.
- $^{\rm 15}$  Time Warner Cable is a member of Change the Equation.

Change the Equation (CTEq) is a nonprofit, nonpartisan, CEO-led initiative that is mobilizing the business community to improve the quality of science, technology, engineering and mathematics (STEM) learning in the United States. Since its launch in September 2010, CTEq has helped its more than 100 members connect and align their philanthropic and advocacy efforts so that they add up to much more than the sum of their parts. CTEq's coalition of members strives to sustain a national movement to improve PreK-12 STEM learning by leveraging and expanding its work focusing on three goals: improving philanthropy, inspiring youth and advocating for change.

www.changetheequation.org

